

FLOW REACTORS FOR CHEMICAL CONVERSIONS WITH  
HETEROGENEOUS CATALYSTS  
ABSTRACT OF THE INVENTION

Improved apparatus for use in process systems which include exothermic  
5 chemical conversions of organic compounds to value added products is disclosed,  
more particularly, flow reactors for exothermic chemical conversions using a fixed  
heterogeneous catalyst with means for control of the exotherm. Flow reactors of the  
invention comprise a plurality of walled conduits each having an outer surface  
disposed for contact with a heat-transfer medium, an inlet distribution manifold  
10 adapted for flow communication with a downstream manifold through channels  
formed by heterogeneous catalytic material disposed within each conduit during  
operation in a sequence of zones for catalyst having the same or different length  
along the longitudinal coordinate of the conduit and within each zone essentially  
uniform cross-section of the conduit measured in a plane perpendicular to the  
15 longitudinal coordinate thereby defining volume of the zone, and the sequence of  
zones comprising of at least two zones such that each downstream zone has a larger  
or smaller cross-section than the contiguous upstream zone. Another aspect of the  
invention includes processes which use such flow reactors, for example the  
continuous manufacture of maleic anhydride.